

In the Specification

Please replace the paragraph at page 3, line 15 with the following amended paragraph:

The problem is shown in ~~figure~~Figure 1. The medical instrument 1 with its reactive coordination system  $x'y'z'$  shall be determined in its position relative to the patient coordination system  $xyz$ .

Please replace the paragraph at page 3, line 18 with the following amended paragraph:

Both the adjustment of the instrument insertion channel 10 and the adjustment of the device 3, which essentially corresponds to the devices 1 and 2, can be correlated to each other by an angle adjustment (see Figure 4). An angle adjustment for the azimuth angle 14 and an angle adjustment for the zenith angle 15 are possible on the device 3. When the position of the device 3 is known, the position of the instrument insertion channel 10 will also be known automatically. By an automatic pick-off of angular movement not shown in Figure 4, azimuth and zenith angle could be directly measured and included into the MR image. The MR image could then always adjust to the orientation of the instrument insertion channel 10 so that the operation site 16 will always be optimally in the sight vane in the imaging of the MRI device. In such case, markers 20', 20'', and 20''' according to the principles 20', 20'', and 20''' stated herein could be adapted in the device 3 or in a top for angle measurement 21. Reversedly, it is also possible to measure the angle within the MR image and then to adjust at the device, i.e., the device follows the MR image.

Please replace the paragraph at page 4, line 20 with the following amended paragraph:

A further possibility of adjustment of the instrument insertion channel 10, as shown in Figure 11, is to position the instrument insertion channel by means such as a rotating and tilting motion via a worm wheel 11 mechanically or by motor, pneumatically, or by wire pull.

Please replace the paragraph at page 4, line 27 with the following amended paragraph:

In order to adapt the device to the imaging of the MRI device, a navigation system is to be integrated into the device itself. Figure 2 shows a device 2 with an instrument insertion channel 10 and three laterally extended reflectors 12. The three mountings 13 for the reflectors 12 can be

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manufactured from one piece or can be three separate parts. The reflectors 12 could also be active optical light-emitting diodes. In such arrangement, the three reflectors or sending elements 12 can be monitored by an external camera system, and, due to the relative position of these three elements to each other, the spatial orientation of the device can be calculated and then be integrated in the MR image. Better still is the application of markers which are directly identified by the "magnet" (MRI), since this will prevent inaccuracies upon matching the coordination systems.

Please replace the paragraph at page 5, line 7 with the following amended paragraph:

Figure 3 shows that this navigation device can also be directly connected to the instrument insertion channel 10. There could also be a navigation system for the device 2 as well as for the instrument insertion channel 10, resulting in having two navigation systems working with either different wavelengths or different codification or with different geometrically designed reflectors 12. The device can be manufactured of a material that is not depictable under MRI or with other radiological imaging methods. Single parts or areas of the device could be designed of a material that is actively or passively identifiable under MRI. For instance, the entire device for the operation under MRI could be manufactured of plastics such as PEEK, and only certain parts would be designed of titanium. The device could also be designed to have hollow spaces containing a liquid which will emit active signals, such as liquids with unpaired proton spin, for instance a gadolinium-based liquid. Figure 10 shows a double-walled top filled with a signal-emitting liquid.

Please replace the paragraph at page 5, line 20 with the following amended paragraph:

Figure 5 shows a device 4 designed completely of plastics, preferably PEEK (polyetheretherketone). This device 4 is screwed into the skull with a self-cutting thread 19. Owing to the hardness of the plastic material, the device can be manufactured with a self-cutting thread. Such plastic device 4 is preferably designed as a disposable. Two navigation points, which could be placed inside the device either separated from one another or together, shall be exemplarily described at the device. As one possibility, the adjusting screw 17 in this PEEK instrument could be made of titanium. Titanium is imaged negatively, as a black spot, in the MRI device, so that the position of the device 4 is recognizable. With two further titanium points, the orientation of the device 4 can

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be identified in a similar way as with the navigation system of Figures 3 or 2. A gadolinium-containing liquid is filled into a hollow space 18 in this device. This liquid is an active liquid for the MRI device, to be imaged as a white spot in the MR image. With three such hollow spaces filled with a gadolinium-containing liquid, here also the position of the device 4 can be determined. It is now possible to combine such active spots such as the hollow spaces 18 with the respective active or passive points 17, or self-reflecting or luminous marker points 12, which will be identified by the MRI device or a navigation system connected to the MRI device. In this way, the localization and navigation of the device within the MRI is ensured. By use of various positioning points depicted differently in the MR image, it is possible to achieve an exact allocation of the measured points to the points at the device.

Please replace the paragraph at page 6, line 12 with the following amended paragraph:

The orientation of the instrument with regard to the operation system, or, in other words, the adaptation of the image to the device presented herein via the MRI device, can also be realized with the markers 20, according to the principle 20 stated herein, not only attached to the device 3 itself, but also to the instrument 24, being inserted into the minimally-invasive channel 2 for a certain procedure, and to the angle measuring system 25 (Figure 7).

Please replace the paragraph at page 6, line 18 with the following amended paragraph:

Figure 7 shows the process of pushing an instrument 24 through the device 3 into the operation area. A marker 20' is placed at its distal end 20', a second marker 20'' in the insertion center of the device 3 as shown in Figure 5. The third marker 20''' is positioned on the angle measuring system 25, which is freely adjustable around the device. The plane visible in the MR image will then be extended by the three points 20', 20'', and 20'''. Thus one will always see the instrument with its inserted length in the brain region, which is determined by the third point placed on the circular angle measuring system 25. Such marking points could also be designed as small coils, as, for example, laid open with number 200 in patent application US 5,353,795 by Sven P. Souza in Figure 2. Such an element is an active coil sending with a certain frequency and being deflected according to the system presented in the above-mentioned patent.

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